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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/741,529	12/19/2000	Quanyuan Shang	005434	6382

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APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER
KORNAKOV, MICHAIL

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 08/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/741,529

Applicant(s)

SHANG ET AL.

Examiner

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Objections

1. Claim 3 objected to because of the following informalities: Claim 3 recites "...activating ...through a means...". Apparently the word "a" should be deleted. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recited in claim 1 "...feed gas does not clean the process chamber..." constitutes an indefinite subject matter, because it is not clear whether the feed gas does not react with chamber residues or the feed gas is not supplied to the process chamber, however could react with chamber residues if being supplied. Furthermore, the recited negative limitation itself renders the claim indefinite because it is an attempt to claim the invention by excluding what the inventors did not invent rather than distinctly and particularly pointing out what they did invent. Consult *In re Schechter*, 205 F.2d 185, 98 USPQ 144 (CCPA 1953).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Dyer (U.S. 6,209,483).

Dyer teaches a method of removing residues from CVD processing chambers utilizing fluorine ions and free radicals (compare to cleaning gas, as instantly claimed), which are produced in high density plasma pre-ionization module from so called Non-Green House gases, such as C_2F_5H or CF_3H (compare to a feed gas, as instantly claimed) (see Abstract; col. 2, lines 40-43; 29-35). Dyer specifically emphasizes that etching of residues like silicon dioxide is dominated by fluorine ions and free radicals (col.1, lines 20-22) and cleaning with hydrogenated PFC gases or HF is inefficient and should be avoided due to formation of polymers (col.col.1, lines 63-65; col.2, lines 1-5). The data of Table (col.3) shows that C_2F_5H or CF_3H does not clean the chamber at all (compare to the negative limitation of the instant claim, stating that feed gas does not clean the process chamber). The teaching of Dyer comprises the steps of formation

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fluorine radicals in a separate HDP module and introducing these radicals into CVD chamber for cleaning (Fig.1 and 2).

Therefore, all the limitations of instant claim either explicitly or inherently met by Dyer.

6. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Nowak et al. (U.S. 6,366,346).

Nowak teaches cleaning of substrate processing chambers utilizing remotely generated plasma. The plasma is used to dissociate (compare to convert, as instantly claimed) a precursor (compare to feeding gas as instantly claimed) into chemically active species, such as fluorine radicals (compare to cleaning gas, as instantly claimed), that are transported into the process chamber to react with the deposition residue during the cleaning process (col.2, lines 18-26). Precursor is converted into fluorine radicals and other reactive species by applying microwave plasma generator. Because up to 99.99% of precursor is dissociated or converted into active fluorine radicals (paragraph, bridging col.7 and 8), the precursor itself does not clean the processing chamber.

Therefore, all the limitations of instant claim either explicitly or inherently met by Nowak.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al. (U.S. 5,788,778) in view of Nicolas (U.S. 5,284,605) and in further views of Karwacki et al (U.S. 5,569,151).

Shang teaches a method of cleaning a deposition chamber that is used in fabricating electronic devices. The method of Shang comprises delivery of reactive gas (compare to cleaning gas, as instantly claimed), such as fluorine, into remote

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plasma chamber, that is outside of the deposition chamber, activating the reactive gas utilizing microwave energy and **flowing the activated reactive gas from the remote chamber into the deposition chamber** to clean the inside of the deposition chamber (see Abstract; col.6, line 27). The teaching of Shang remains silent about the specific steps of obtaining and storing the cleaning gas. However, these steps are practically immaterial for the cleaning process per se, unless criticalities of such specific steps are provided.

Fluorine is routinely produced by electrolysis of HF (feeding gas, as instantly claimed) and stored for further use in storage units. The process of separating HF from fluorine containing gaseous mixture by condensing HF (compare to converting feed gas into liquid form) is conventionally utilized in order to produce pure fluorine.

Thus, Nicolas teaches that fluorine gas is generally obtained by electrolysis of anhydrous hydrofluoric acid and that produced fluorine may carry some HF, which may be a troublesome impurity in subsequent applications of the fluorine (col.1, lines 17-24). In order to separate HF from fluorine Nicolas refrigerates the gaseous mixture of HF and fluorine, condenses HF into liquid form and, thus obtaining a pure fluorine (col. 2, lines 5-22). Karwacki teaches filling, storing and delivery of fluorine to the processing site, utilizing container, which is approved by the Department of Transportation (col.2, lines 44-48; col. 3, lines 52-60).

Therefore a person skilled in the art would have found it obvious to obtain purified fluorine as per teaching of Nicolas and deliver this fluorine to the processing site

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of Shang in the safe container of Karwacki in order to facilitate the process of Shang with the reasonable expectation of success.

Furthermore, a "new" process can still be obvious when considered as a whole notwithstanding that specific starting materials are not disclosed in the prior art, *In re Durden, Jr.* 226 USPQ 359 (CAFC 1985).

Therefore, combination of references renders claims 1-15 prima facie obvious and properly rejected under 35 U.S.C. 103(a).

10. Applicant should note that additional prior art cited in PTOL-892 shows general state of the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (703) 305-0400. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872 9310 for regular communications and (703) 872 9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 2450.

Michael Kornakov
Examiner
Art Unit 1746

MK
August 8, 2002

A handwritten signature in black ink, appearing to read "Randy Gulakowski", with a stylized, cursive script.

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700